



(43) International Publication Date
7 April 2005 (07.04.2005)

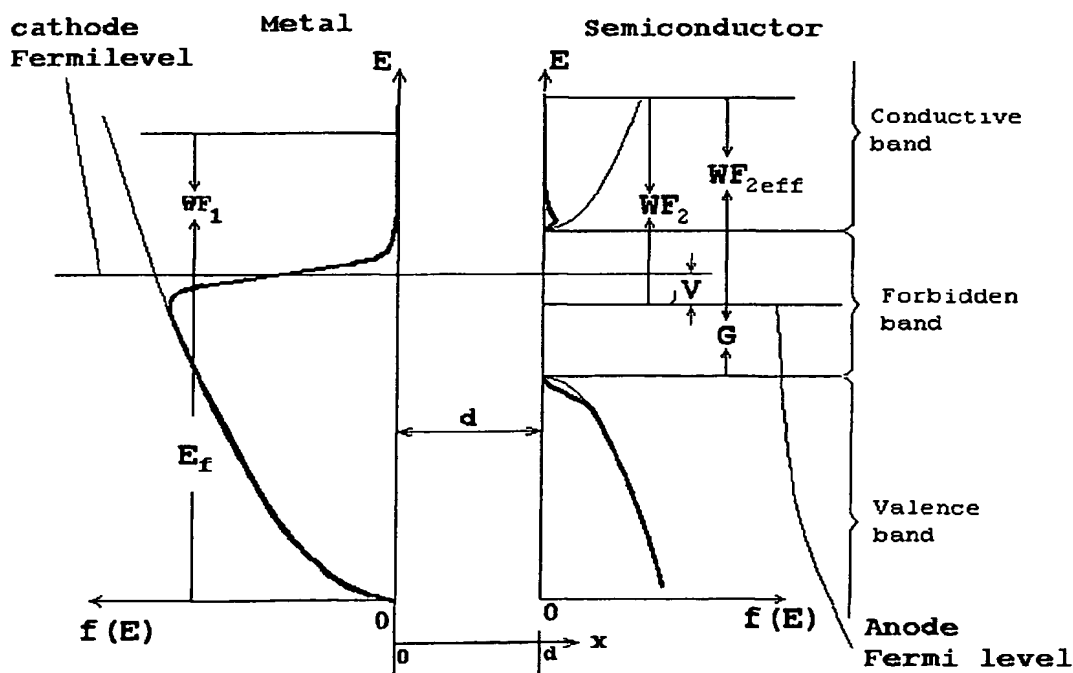
PCT

(10) International Publication Number
WO 2005/031780 A3

- | | |
|---|---|
| <p>(51) International Patent Classification⁷: H01L 21/332,
21/8222, 21/20</p> <p>(21) International Application Number:
PCT/US2004/031221</p> <p>(22) International Filing Date:
22 September 2004 (22.09.2004)</p> <p>(25) Filing Language: English</p> <p>(26) Publication Language: English</p> <p>(30) Priority Data:
0322116.5 22 September 2003 (22.09.2003) GB</p> <p>(71) Applicant (for all designated States except US): BOREALIS TECHNICAL LIMITED [US/US]; 23545 N.W. Skyline Boulevard, North Plains, OR 97133-9204 (US).</p> <p>(72) Inventors; and</p> <p>(75) Inventors/Applicants (for US only): MARTSINOVSKY, Artemi [RU/RU]; 1B-19 Maily Prospects PS, St.Petersburg</p> | <p>197 198 (RU). COX, Isaiah, W. [US/GB]; 27 Heathway Court, London NW3 7TS (GB).</p> <p>(74) Agent: BOREALIS TECHNICAL LIMITED; Rodney T. Cox, Chairman and CEO, 23545 NW Skyline Blvd, North Plains, OR 97133-9204 (US).</p> <p>(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.</p> <p>(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,</p> |
|---|---|

[Continued on next page]

- (54) Title:** TUNNELING GAP DIODES



- (57) Abstract:** The present invention discloses a tunneling diode having a band gap material as the collector. This increases the tunneling of electrons having greater energy than the Fermi level from emitter to collector, leading to an increase in the efficiency of heat pumping or power generation by the diode. This approach also reduces back tunneling of electrons from collector to emitter.



SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:

22 September 2005